NSS-146

Fermilab

Development of a New Data Acquisition System for the Fermilab Beam Loss Monitors

C. Drennan, A. Baumbaugh, K. Knickerbocker, J.D. Lewis,
A. Marchionni, C. Needles, M. Utes, M. Olson, S. Pordes

Data Acquisition:

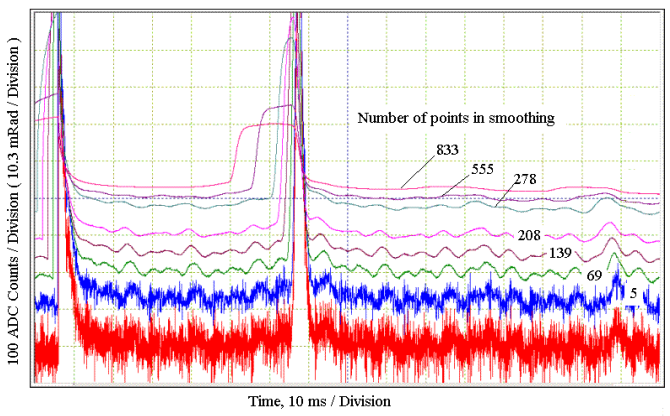
- 21 μs integration and sampling interval.
- 64k sample circular buffer of integrated values per channel with time stamps.
- 3 variable length running sums computed every 21 μs per channel.
- 4k circular buffer history of each sum, sampled appropriately, with time stamps.

Abort Logic for Tevatron Protection:

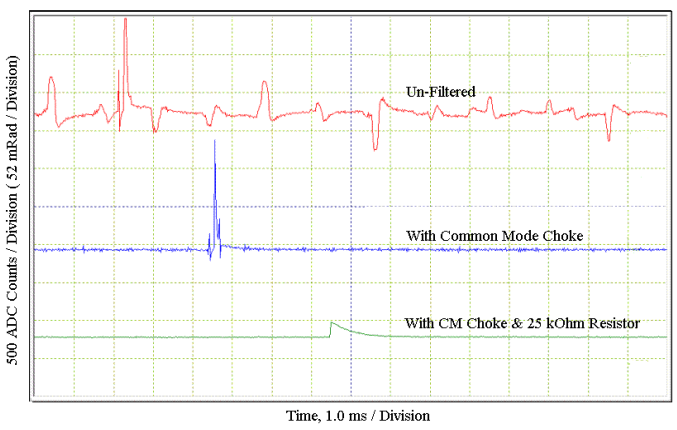
- Programmable thresholds for each of the 3 running sums for each channel.
- Thresholds comparisons are made every 21 μs.
- Any threshold comparison can be masked off.
- Programmable multiplicity requirement for over threshold conditions to cause a beam abort.
- Thresholds, abort masks and abort multiplicity requirements are automatically reprogrammed according to the accelerator state.

Diagnostic History:

- 1.4 seconds of 21 μs beam-loss measurements
- 8.0 seconds of 1 ms integrated losses
- 200 seconds of 50 ms integrated losses
- 4000 seconds of 1 s integrated losses



Plot of the data from a Main Injector BLM showing the effects of data smoothing. Data samples were taken at 47.6 kHz.

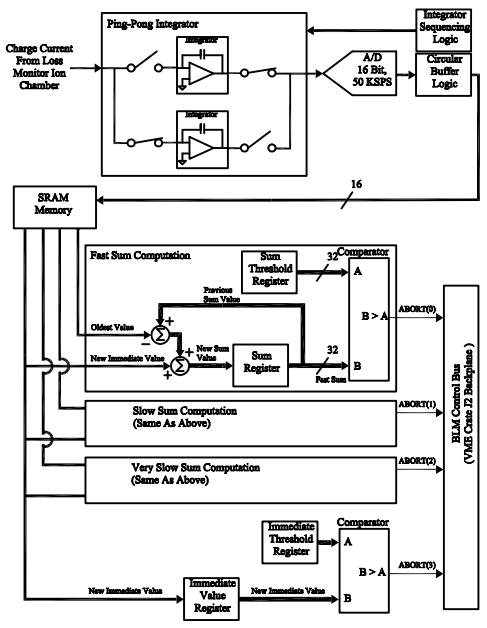


Plot of the data from a FNAL Booster BLM showing the effects of The common mode choke and additional input series resistance. Data samples were taken at 47.6 kHz.

System Modules:

- Integrator / Digitizer Card (Prototype Shown Below)
- Control Card
- Timing Card
- Abort Concentrator Card
- MVME 2800 Crate Processor

Abort Logic on the Integrator/Digitizer Card for One of Sixty-Four Channels



Abort Logic on the Abort Concentrator Card